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Knowledge, attitude and practice of primary school teachers towards students with hypoglycemic attack in Tabuk Region, Saudi Arabia

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ABSTRACT

Background: Hypoglycemia is common among school children with type 2 diabetes, if not managed promptly brain damage might happen. Therefore, the current study aimed to assess the primary school teacher's knowledge and attitude about hypoglycemia among students with type 1 diabetes. **Methodology:** This is a cross-sectional study conducted among 434 primary school teachers in Tabuk City, Saudi Arabia during the period from March 2020 to September 2020. A non-probability convenience sampling method was used to recruit the participants. A self-administered questionnaire involves questions on demographic data, knowledge, and attitude regarding hypoglycemia was used. All the participants signed a written informed consent and the Statistical Package for Social Sciences (SPSS) was used for data analysis. **Results:** Out of 434 primary school teachers, the majorities were females; the knowledge regarding hypoglycemia was sub-optimal (only 68% showed excellent and good knowledge). Regarding the attitude, a major defect was observed as only 75.6% know how to use a glucometer, and a minority (6.7% knew the rule of 15, 15, and 15). The school facilities for hypoglycemia management are alarming (47% and 41.7% had glucometers and school clinics respectively), the majority of teachers recommend sessions on glucometer use and hypoglycemia symptoms. **Conclusion:** Knowledge and attitude were sub-optimal among primary school teachers in Tabuk City, campaigns are to be held to increase the awareness regarding hypoglycemia.

Keywords: Knowledge, attitude, hypoglycemia, schoolteachers, Tabuk, Saudi Arabia

1. INTRODUCTION

Diabetes mellitus (DM) is increasingly spreading among all age groups (9.3%, 463 million people in the year 2019) and the expectations are 10.2% (578



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million), and 0.9% (700 million) for the years 2030 and 2045 (Saeedi et al., 2019). Both types of diabetes are on the rise among children and adolescents and in some countries type 2 diabetes is equal to type 1 diabetes (accounted for 8-45% of all reported cases) (Temneanu et al., 2016). DM is a morbid disease with high mortality due to its acute and chronic complications, hypoglycemia is a serious complication of anti-diabetic medications (those on insulin and long-acting sulphonylureas are a special risk). Hypoglycemia is linked to severe neuroglycopenia, death, cardiovascular disease, and dementia, importantly, severe hypoglycemia anxiety displayed among some of the patients, and their families may lead to suboptimal self-care and poor glycemic control (Driscoll et al., 2016). The patient's understanding of low blood glucose, its risk factors, and the steps in the prevention and treatment are integral parts in the patients and the community education (Freeland et al., 2017). The self-management of diabetes mellitus among young age groups is challenging and the collaboration between the families, healthcare personnel, and school teachers are crucial (de Cássia Sparapani et al., 2017). No brain, the provision of the appropriate knowledge to school teachers regarding diabetes, and practical training for the detection and treatment of hypoglycemia are crucial to saving lives among children with type 1 diabetes. Because of this, we conducted this survey to assess the knowledge of primary school teachers regarding hypoglycemia among students with type 1 diabetes.

2. MATERIALS AND METHODS

Study Design

This is a cross-sectional study conducted among primary school Saudi teachers in Tabuk City, Saudi Arabia during the period from March 2020 to September 2020. Participants were included if they are (1) Primary school Saudi teachers (2) their age from 30–50-year-old (2) living in Tabuk region, Saudi Arabia (3), and children with diabetes in the chosen schools. Students and their families and administrative staff were not included.

Sample Size

The sample was collected by a non-probability convenience sampling method, according to the availability and accessibility of the participants considering the number of primary schools Saudi teachers in the Tabuk region. The sample size was collected to find 385 participants will be enough to validate the date and finding of the study. The sample size will be calculated using this calculator (<http://www.calculater.net/sample-size-calculator.html>).

Data Collection

An online data collection sheet was developed. The Self-administered questionnaire involves questions that are categorized into five sections: demographic questions, including gender, age, educational level, city, and social status; the knowledge of primary school Saudi teachers about hypoglycemic attacks (six questions on symptoms including pallor, tremor, sweating, behavior change, loss of consciousness, and convulsions). Assessing their behavior in dealing with hypoglycemic students (glucometer use, rule of 15, the effect of consciousness on treatment, fast absorption sugars, when to check the blood sugar after the intervention, and what to do if the blood sugar remains below 70mg/dl). The school readiness to deal with the cases if there is a clinic or glucometer is it necessary to teach the teachers and held a campaign to increase the awareness regarding hypoglycemia and glucometer use, and assess the awareness of teachers about the importance of knowing hypoglycemic symptoms and management. The questionnaire was modified from previous literature (Kelo et al., 2011; Luque-Vara et al., 2020).

Data Management and Statistical Analysis

Statistical analysis for this study was conducted in IBM SPSS Statistics. Percentages and frequencies were used to summarize qualitative data. Pearson correlation was used to test the relationship of age to hypoglycemia knowledge.

Ethical Considerations

The teacher's consent and participation are required. A study was conducted after approval of the ethical committee of the Medical College, the University of Tabuk (ref. READ 0065, dated 26/12/2019). The study complies with the World Medical Association Declaration of Helsinki regarding the ethical conduct of research involving human subjects. All collected data are kept confidential and used for this research only.

3. RESULTS

A total of 434 persons participated in this study. Most participants' ages were 30-40 years (44.7%) followed by 40-50 years (43.1%). Regarding specialization, 56 participants (12.9%) were math teachers, 21.4% were religious sciences teachers, 7.8%, 9%, and 18.7% were social studies teachers, sciences teachers, and Arabic language teachers respectively. While 30.2% was other. Regarding the number of teachers who have children with diabetes, their number was 25 (5.8%) and the number of those who have no children with diabetes was 409 (94.2%) (Table 1).

Table 1 Demographic data			
		Frequency (n)	Percent (%)
Age Group	Younger than 30	23	5.3
	30-40	194	44.7
	40-50	187	43.1
	Older than 50	30	6.9
Specialization	Social studies	34	7.8
	Math	56	12.9
	Sciences	39	9.0
	Religious sciences	93	21.4
	Arabic language	81	18.7
	Other	131	30.2
Do you have a child with diabetes	Yes	25	5.8
	No	409	94.2

Regarding hypoglycemia knowledge, 97.2% agreed that pallor is a symptom of hypoglycemia, 84.8% agreed that sweating is a symptom, and the majority (89.2%) stated that tremor is among the hypoglycemic symptoms. Other shades of hypoglycemia knowledge are depicted in table 2. Regarding the attitude towards hypoglycemia, 75.6% of teachers knows how to use the glucometer, only one in five knew the effects of losing consciousness on hypoglycemia management, only 6.7% knew the rule of 15, 15, and 15, while 54% did not know fast absorbing sugar. Table 3 depicted the teacher's attitude regarding hypoglycemia.

Table 2 Knowledge on information of teachers towards students with hypoglycemic attack (n: 434)

Character		(n)	(%)
Is pallor a symptom of hypoglycemia	I totally agree	103	23.7
	I agree	241	55.5
	I don't know	71	16.4
	I don't agree	15	3.5
	Strongly disagree	4	.9
Is sweating a symptom of hypoglycemia	I totally agree	167	38.5
	I agree	201	46.3
	I don't know	52	12.0
	I don't agree	13	3.0
	Strongly disagree	1	.2
Is tremor a symptom of hypoglycemia	I totally agree	185	42.6
	I agree	211	48.6
	I don't know	26	6.0

	I don't agree	9	2.1
	Strongly disagree	3	.7
Are stress and change in behavior symptoms of hypoglycemia	I totally agree	97	22.4
	I agree	186	42.9
	I don't know	109	25.1
	I don't agree	37	8.5
	Strongly disagree	5	1.2
Is loss of consciousness a symptom of severe hypoglycemia	I totally agree	267	61.5
	I agree	152	35.0
	I don't know	11	2.5
	I don't agree	3	.7
	Strongly disagree	1	.2
Are convulsions a symptom of hypoglycemia	I totally agree	78	18.0
	I agree	122	28.1
	I don't know	168	38.7
	I don't agree	62	14.3
	Strongly disagree	4	.9

Table 3 Attitude, and practice on information of teachers towards students with hypoglycemic attack (n : 434)

Do you know how to use a glucose meter	Yes	328	75.6
	No	106	24.4
Does staying or losing consciousness do not affect the way the patient is treated	I totally agree	18	4.1
	I agree	68	15.7
	I don't know	103	23.7
	I don't agree	181	41.7
	Strongly disagree	64	14.7
Do you know rule 15 15 15	Yes	30	6.9
	No	404	93.1
If the patient is conscious it is given	15g of slow - absorbing sugars	46	10.6
	15g of fast absorbing sugars	198	45.6
	I don't know	190	43.8
An example of a fast absorbing sugar is	I don't know	54	12.4
	3 tablespoons of sugar dissolved in a cup of water	57	13.1
	6 pieces of sweets	3	.7
	All the above	181	41.7
	None of the above	2	.5
	Honey spoon	64	14.7

	Half a cup of juice	73	16.8
After the conscious patient is given sugars, when is blood sugar measured	I don't know	130	30.0
	After a quarter of an hour	183	42.2
	After an hour	64	14.7
	After a half an hour	57	13.1
If the blood sugar level remains below 70mg 15 minutes after administering 15 grams of sugars to the patient, what is the right thing to do	I don't know	126	29.0
	Replay steps from the beginning	30	6.9
	Repeat the measurement of glucose again after 15min	68	15.7
	Call an ambulance	210	48.4
When to give the patient 15 grams of carbohydrates	I don't know	294	67.7
	When the blood sugar level reaches 90	12	2.8
	When the blood sugar level reaches 70	95	21.9
	When the blood sugar level reaches 100	33	7.6
If the patient is unconscious what you will do	I don't know	278	64.1
	Wait 15 min	24	5.5
	Glucagon needle injection	132	30.4
Do you know how to inject glucagon needle?	Yes	92	21.2
	No	219	50.5
	I don't know	123	28.3
When the patient's condition improves after the glucagon needle, what will you do?	I don't know	155	35.7
	Fix sugar level with a snack	97	22.4
	Let the patient rest for an hour	66	15.2
	Transfer the patient to hospital	116	26.7
If the glucagon needle is not available and the patient is unconscious, what will you do?	I don't know	93	21.4
	Try to give the patient honey	68	15.7
	Try to give the patient juice	53	12.2
	Transfer the patient to hospital	220	50.7
Do you always carry a fast-absorbing sugar?	yes	96	22.1
	no	338	77.9

In the present study, only 47% of schools had a glucometer, 41.7% of schools had clinics, 99.3% of teachers agreed that the teachers should know about hypoglycemia symptoms, 97.8% acknowledge the knowledge how to use a glucometer, while 98.6% recommended that campaigns to be held to increase the awareness regarding hypoglycemia (Table 4). The majority of teachers have good knowledge and attitude towards students with hypoglycemic attack (n = 267, 60.1%), while 129 (29.1%) have satisfactory knowledge and attitude and 35 (7.9%) of them have excellent knowledge and attitude and rest of them have poor knowledge and attitude 13 (2.9%) (Figure 1).

Table 4 School preparations towards students with hypoglycemic attack (n: 434)

Is there a blood glucose meter in the school?	yes	204	47.0
	no	230	53.0
A medical clinic is available at the school	Yes	181	41.7
	no	253	58.3
Is it necessary to know the teachers of the symptoms of hypoglycemia?	I totally agree	355	81.8
	I agree	76	17.5
	Strongly disagree	1	.2
Is it necessary to train the teachers on the glucometer	I totally agree	350	80.6
	I agree	74	17.1
	I don't agree	4	.9
	Strongly disagree	2	.5
Is it necessary to conduct campaigns in schools to raise awareness of hypoglycemia	I totally agree	361	83.2
	I agree	67	15.4
	Strongly disagree	1	0.2

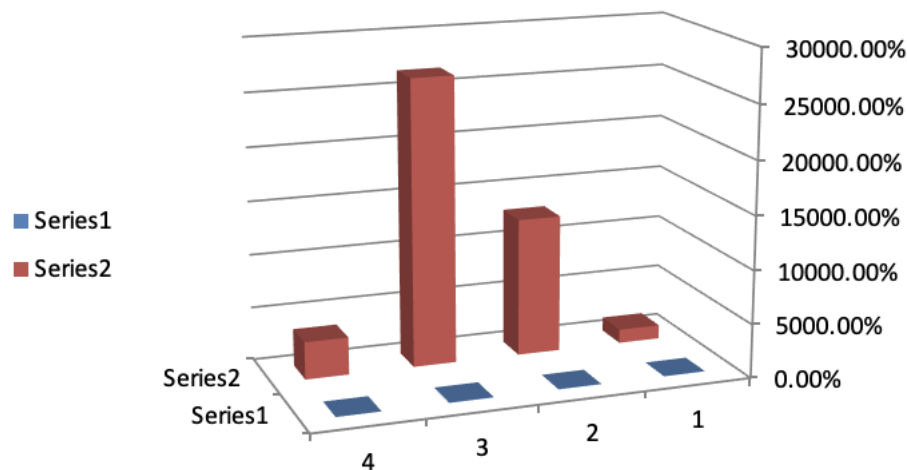


Figure 1 knowledge and attitude towards students with hypoglycemic attack

4. DISCUSSION

The responsibility of teachers towards student's increases when considering the long time students spend each day in schools, furthermore primary school students required additional care and attention from their teachers due to their poor awareness. Children with diabetes mellitus put a further burden on teachers' shoulders because they required special care in some aspects like

their meals and behaviors to ensure their safety. Sufficient teachers' knowledge will reflect in their students, which indicates their important role, especially primary school teachers due to their significant effect on children's futures (Alnasir et al., 2004). The results indicate that although most of the teachers have good knowledge about hypoglycemia the attitude, and practice of information of teachers towards students with a hypoglycemic attack is not enough. These results were contrary to a study about Assessment of Knowledge and Attitude of School Teachers Regarding Diabetes Mellitus in the Ha'il Region, Saudi Arabia, where teachers show good attitudes and management practice (Al Duraywish and Abdelsalam, 2017). Previous studies concluded the poor knowledge regarding diabetes mellitus and its complications, including hypoglycemia (Aycan et al., 2012).

Primary school teachers may lack an appropriate attitude with diabetic students because diabetes is not given special concern in schools (Alzahrani et al., 2019). This reason should be taken into account when considering the school preparations results which show 53% of schools don't have a glucometer and 58.3% of schools lack of medical clinic. In the present study, nearly one-third of teachers scored poor or satisfactory indicating that the teachers might feel insecure handling a child with hypoglycemia, the current findings were similar to a previous study conducted in Spain and concluded that 47% of teachers are not secure (Gómez Manchón et al., 2009). 99.3% of teachers agreed on the importance of known hypoglycemia symptoms, 97.8% of them concurred with glucometer training significance. While previous research has focused on teachers', desire to participate in diabetes-care programs (Al Duraywish and Abdelsalam, 2017).

Training courses to improve the teacher's knowledge and written instructions on what to do are needed. Another relevant option is the incorporation of professionals in educational institutes, including trained nurses. Attending diabetes-training sessions gives teachers a remarkable advantage in their knowledge (Rodríguez-Almagro et al., 2012; Alsaeed et al., 2017).

Limitations

The study limitations were the reliance on a self-administered questionnaire, which is more prone to subjectivity, the relatively small sample size, and the fact that the study was conducted in one City, so generalization to the whole Kingdom cannot be insured.

5. CONCLUSION

This study showed suboptimal knowledge of schoolteachers regarding hypoglycemia, so it is necessary to provide special training courses for teachers. Future studies should take into account the association between knowledge, attitude, and practice of information of teachers towards students with hypoglycemic attack and type of schools (private or government schools), also the association with gender.

Author's contribution

Alsaari Reem Ali Y, Rawabi Wajdi A Gabban, EsraaYehea Hasan Ma'ashi: The concept and design, and drafting of the methodology.

Nura Jamil Ahmed Abubaker, Amal Naif Muidh Althobaiti: Drafting of the introduction and statistical analysis.

Hyder Mirghani: Drafting the discussion.

All the authors revised the final version of the manuscript and approved it before submission.

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Ethical approval

The Medical Ethics Committee of the Medical College, Tabuk University approved the study (ethical approval code: READ 0065).

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Conflict of Interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are presented in the paper.

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